Patent Claims

1.   Electrooptical system containing

-    a twisted nematic liquid-crystal layer between 2 substrates whose insides are
     provided with electrode coatings and alignment layers thereon, the liquid
5   crystal having a parallel edge alignment and a twist angle of $0° \leq \beta \leq 100°$
     or a homeotropic edge alignment,

-    one or more layers for compensating the optical path difference of the liquid-
     crystal layer d • Δn, and

-    at least one device for linear polarisation of light in such an arrangement that
10   light, before entering and after exiting the liquid-crystal layer, passes
     through a polarisation device, at least once in each case,

characterised in that, in order to achieve high contrast, and/or high brightness,
and/or high viewing angle independence of the contrast and/or the colour values, the
angle ψ, which the polarization device forms on the input side with the preferential
15   direction of the liquid-crystal molecules on the first substrate satisfies condition (1)
or (2)

$$\psi = (\beta + 90°)/2 \pm 10° \qquad (1)$$

$$\psi = \beta/2 \pm 10° \qquad (2)$$

if a polarisation device is present on both the input side and the output side, the
20   polariser on the output side being rotated by $90° \pm 10°$ with respect to the polariser
on the input side, and it also being possible for the alignments of the polarisers on
the input side and the output side to be interchanged,

or satisfies condition (3) and (4)

$$30° \leq \psi \leq 70° \text{ for } 0 \leq \beta \leq 45° \qquad (3)$$

$$35° \leq \psi \leq 90° \text{ for } 45 \leq \beta \leq 100° \qquad (4)$$

if a polarisation device is only present on the input side.

2.   System according to Claim 1, characterised in that the compensation layer is based on a thermoplastic polymer, a low-molecular-weight liquid crystal and/or a liquid-crystalline polymer.

3.   System according to at least one of Claims 1 and 2, containing a liquid-crystal layer which has a parallel edge alignment and a twist angle of $0 < \beta < 100°$, characterised in that the compensation layer is based on a twisted nematic liquid crystal, the twist angle β^1 of the compensation layer having essentially the same absolute value but the opposite rotational sense as β and the preferential directions of the liquid-crystal molecules of the liquid-crystal layer and the compensation layer forming an angle of between 30^0 and 150^0 at the surfaces facing one another.

4.   System according to at least one least one of Claims 1 and 2, containing a liquid-crystal layer which has a parallel edge alignment and a twist angle of $0 < \beta < 100°$, characterised in that the compensation layer is based on a material having 3 optical refractive indices, of which one is less than the other two, the axis

5   corresponding to this refractive index being essentially parallel to the electrode surfaces or forming an angle of $2^0 < \tau < 60^0$ with the electrode surface, so that the angle between the optical axes of the compensation layer and the addressable liquid-crystal layer on application of a voltage passes through a minimum, and that the plane set up by the two other refractive indices with the directors of the liquid-

10   crystal layer forms an angle of between 30^0 and 150^0 at the surfaces facing one another.

5.   System according to at least one of Claims 1 and 2, containing a liquid-crystal layer which has a homeotropic edge alignment, characterised in that that compensation layer is based on a material having 3 optical refractive indices, of which one is lower than the other two, the axis corresponding to this lower

5   refractive index being essentially perpendicular to the electrode surfaces.

6.   System according to Claim 5, characterised in that the liquid-crystal layer has a twist angle of is $0° < \beta \leq 90°$.

7.   System according to at least one of Claims 1-4 or 6, characterised in that the twist angle is $5° \leq \beta \leq 60°$.

10   8.   System according to at least one of Claims 1-7, characterised in that the system contains only one polarisation device, and at least one reflector.

9.   Electrooptical system containing

        - a liquid-crystal layer of negative dielectric anisotropy between two substrates whose insides are provided with electrode coatings and alignment layers

15   thereon, the liquid crystal having homeotropic edge alignment, and

        - at least one device for linear polarisation of the light in such an arrangement that the light, before entering and after exiting the liquid-crystal layer, passes through a polarisation device, at least once in each case,

characterised in that the liquid crystal has a twist angle of $0 < \beta < 90°$.

10. Electrooptical system according to claim 9 and at least one of Claims 1, 2 and 5-8.

11. Electrooptical system containing

    - a twisted nematic liquid-crystal layer between 2 substrates whose insides are provided with electrode coatings and alignment layers thereon, the liquid crystal having a homeotropic edge alignment,

    - if desired one or more layers for compensating the optical path difference of the liquid-crystal layer, and

    - at least one device for linear polarisation of the light in such an arrangement that the light, before entering and after exiting the liquid-crystal layer, passes through a polarisation device at least once in each case,

characterised in that the liquid crystal has a twist angle of $0° \leq \beta \leq 100°$ and, in order to improve the viewing angle dependence of the contrast, has an optical path difference $d \cdot \Delta n$ of $\leq 0.40 \ \mu m$.

12. Electrooptical system according to Claim 12 and at least one of Claims 1, 2, 5, 6, 7 and 8.

13. Projection device containing a system according to at least one of Claims 1-12.

14. Compensation layer for compensating the optical path difference of an electrooptical system, which contains

    - a twisted nematic liquid-crystal layer between 2 substrates whose insides are provided with electrode coatings and alignment layers thereon, the liquid

crystal having a parallel edge alignment and a twist angle of $0^0 \leq \beta \leq 600°$,

and

- at least one device for linear polarisation of the light in such an arrangement that the light, before entering and after exiting the liquid-crystal layer, passes

5   through a polarisation device at least once in each case,

characterised in that the compensation layer is based on a material having 3 optical refractive indices, of which one is less than the other two, the axis corresponding to this lower refractive index being essentially parallel to the electrode surfaces or forming an angle of of $2^0 \leq \tau \leq 60°$ with the electrode surface, so that the angle

10   between the optical axes of the compensation layer and the addressable liquid-crystal layer on application of a voltage passes through a minimum, and that the plane set up by the two other refractive indices with the directors of the liquid-crystal layer forms an angle of between of 30^0 and 150° at the surfaces facing one another.